भारतीय मानक
IS 5439 : 2017
Indian Standard

स्वचल वाहनों के लिए दबाव वाले स्विच — विशिष्टि

(दूसरा पुनरीक्षण)

Oil Pressure Switches for Automobiles — Specification

(Second Revision)

ICS 29.120.40; 43.040.20

© BIS 2017

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली-110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.org.in www.standardsbis.in

May 2017
Price Group 3

Automotive Electrical Equipments and Instruments Sectional Committee, TED 11

FOREWORD

This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 30 August 1978, after the draft finalized by the Automobile Electrical Equipment Sectional Committee had been approved by the Electro technical Division Council.

This standard was first published in 1969 and revised in 1978 to upgrade requirements and bring in line with the international practice.

This revision also has been undertaken to upgrade requirements and bring in line with international practices. However, in this revision high temperature test, tightening torque strength test and terminal strength test have been included

The oil pressure switch is intended to give warning of the low pressure of the oil through an indicating lamp in the dashboard. These switches operate when the pressure of oil decreases.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

OIL PRESSURE SWITCHES FOR AUTOMOBILES — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies the mechanical and electrical requirements and methods of test for 6, 12 and 24 V hydraulically operated oil pressure switches for use in automobiles.

2 REFERENCES

The following standards contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
4905 : 1968	Methods for random sampling
8395 (Part 1) : 1977	Specification for cable terminations for automobile wiring – Part 1 : Blade type connectors (Male and female)
9000	Basic environmental testing procedures for electronic and electrical items:
(Part 2/Sec 1 to 4) : 1977	Cold test
(Part 3/Sec 1 to 5) : 1977	Dry heat test
(Part 11) : 1983	Salt mist test

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Rated Voltage — This is the voltage specified by the manufacturer at which the switch is designed to operate satisfactorily. Normally this is 12 V (d.c.).

3.2 Rated Current — This is the current specified by the manufacturer at which the switch is designed to operate satisfactorily. Normally this is 50 mA~600 mA.

3.3 Type Tests — The tests carried out to prove conformity with the specification. These are intended to prove the qualitative requirements and design of a given type of oil pressure switch.

3.4 Routine Tests — Tests carried out on each oil pressure switch to check requirements which are likely to vary during production.

3.5 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

4 MATERIALS, CONSTRUCTION AND WORKMANSHIP

4.1 Material

The body of the switch shall be made of material suitable for tropical use. No hygroscopic material shall be used unless they have been previously rendered moisture-proof.

4.2 Construction

The switches shall be so designed and constructed as to be mechanically robust and free from any operational hazards. They shall be constructed so as to be capable of withstanding vibration, shocks, etc., met with in normal use. They should have adequate resistance to heat and cold. The diaphragm fitted inside the switch shall be capable of withstanding oil at temperature between –25°C and 120°C for 70 h. All exposed metallic surfaces likely to be affected by atmospheric conditions shall be adequately protected to prevent corrosion. The maximum tightening torque for dry sealing should be 30 Nm.

5 TYPES

The oil pressure switches shall be designated with type numbers depending on the switching-on pressure as given in the following table:

Designation	*Switching on Pressure* kPa
Type 1	30 to 70
Type 2	60 to 90
Type 3	80 to 120
Type 4	120 to 170

This standard may be applied for other pressure ranges as agreed to between the supplier and the purchaser.

6 Dimensions

6.1 A typical sketch of an oil pressure switch is shown in Fig. 1. However, the dimension across corners shall not be more than 31.5 mm irrespective of type of oil pressure switch.

6.2 The external terminal arrangement shall be in accordance with IS 8395 (Part I). The threading of the body shall be M 10 × 1 parallel or M 10 × 1 taper. When parallel threads are used a sealing washer shall be provided.

7 TESTS

7.1 Classification of Tests

7.1.1 *Type Tests*

The following shall constitute type tests:

a) Visual examination,
b) Dimensional check,
c) Performance test,
d) Voltage drop test,
e) Endurance test,
f) Pressure test,
g) Salt spray test,
h) Insulation resistance test,
j) Dry heat test,
k) Cold test,
m) Ageing test,
n) Flash test,
p) Sealing test with drilled diaphragm,
q) Tightening torque strength test, and
r) Terminal strength test.

7.1.1.1 *Criteria for Approval*

Eleven samples shall be submitted for testing together with the relevant data. The testing authority shall issue a type approval certificate, if the oil pressure switches are found to comply with the requirements of tests. The samples shall be subjected to the tests in the following manner:

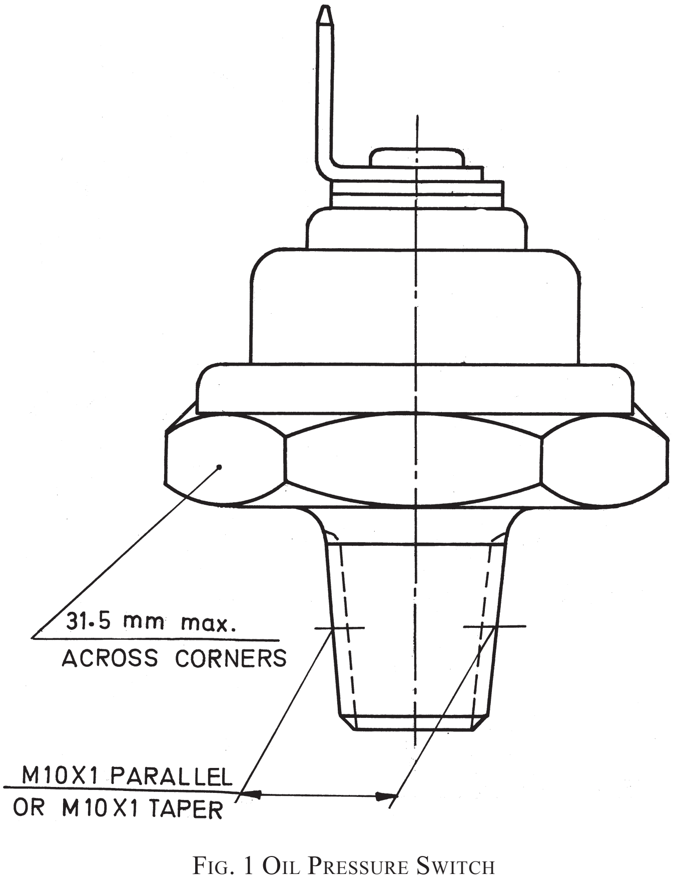

Fig. 1 Oil Pressure Switch

Test (1)	*No. of Samples* (2)
Visual examination	11
Dimensional check	11
Performance test	11
Pressure test	11
Voltage drop test	1
Endurance test	3
Salt spray test	1
Insulation resistance test	1
Cold test	1
High temperature test	1
Dry heat test	1
Ageing test	1
Flash test	1
Sealing test with drilled diaphragm	1
Tightening torque strength test	1
Terminal strength test	1

NOTE — In case of failure of one or more samples in type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to the test(s) in which failure occurred. If, on repeat test(s) no failure occurs, the test may be considered to have been satisfactory.

7.1.2 *Acceptance Tests*

The following shall constitute acceptance tests:

a) Visual examination,
b) Dimensional check,
c) Performance test,
d) Voltage drop test, and
e) Pressure test.

NOTE — The number of samples for acceptance tests shall be as agreed upon between the purchaser and the manufacturer. However a recommended plan of sampling is given in Annex A.

7.1.3 *Routine Tests*

The following shall constitute routine tests all the switches shall be tested for these tests:

a) Visual examination,
b) Performance test, and
c) Pressure test.

8 TESTS PROCEDURES

8.1 Visual Examination

The switch shall be examined for finish and proper assembly and shall be free from injurious flaws or other defects.

8.2 Dimensional Check

The switches shall be checked for dimensional requirements as given in manufacturer's outline drawing.

8.3 Performance Test

The switch shall operate satisfactorily at the switching-on pressure as indicated in the table:

Designation	*Switching on Pressure* kPa
Type 1	30 to 70
Type 2	60 to 90
Type 3	80 to 120
Type 4	120 to 170

NOTE — The other pressure ranges may also be acceptable, if agreed between the manufacturer and the customer.

8.4 Voltage Drop Test

With 1A load and with contacts closed, the voltage drop due to contact resistance shall not exceed 150 mV before endurance test and 400 mV after endurance test. For switches with normally open contacts, the voltage drop test shall be carried out at maximum operating pressure.

8.5 Endurance Test

The switch shall be tested for 100 000 cycles of operation at the rated voltage and a current of 0.4 A. The test shall be carried out using SAE 40 oil maintained at a temperature of 100 + 5°C. The oil pressure shall be varied between 0 and 500 kPa in 0.1 to 0.5 s. The pressure shall be maintained constant at either limit for 1.0 to 2.0 s. At the end of this test, the switch shall pass the performance test and voltage drop test.

8.6 Pressure Test

The switch shall be subjected to a hydraulic pressure of 1 500 kPa for 2 min with SAE 40 oil at 100 ± 5°C and there shall be no leakage. There shall be no change in the operating range of the switch after this test.

8.7 Salt Spray Test

The salt spray test shall be conducted in accordance with IS 9000 (Part 11). At the end of the test the switch shall pass the performance test.

8.8 Insulation Resistance Test

The insulation resistance of the switch when tested with a pressure of 300 kPa at 500 V (d.c.) shall not be less than 1 MΩ. For switches with normally open contact, application of pressure is not necessary at the time of insulation resistance test.

8.9 Dry Heat Test

This test is to be conducted according to IS 9000 (Part 3/ Sec 1 to 5). At the end of the test the switch shall pass the performance test.

8.10 Cold Test

The test is to be carried out according to IS 9000 (Part 2).The temperature severity for this test shall be – 25°C and the recovery period shall be 3 h. At the end of this test, the switch shall pass performance test and voltage drop test.

8.11 High temperature Test

The sample shall be subjected to a temperature of 150°C for 4 h and the recovery period shall be 3 h. At the end of this test, the switch shall pass performance test and voltage drop test.

8.12 Ageing Test

The switch as mounted shall be kept at a temperature of 120°C under oil-pressure of 300 to 400 kPa for 100 h. After this test, the oil pressure switch shall pass the performance test satisfactorily.

8.13 Flash Test

A voltage of 500 V rms shall be applied for 5 s to an oil pressure switch with contacts open. After this test, the switch shall pass the performance test.

8.14 Sealing Test with Drilled Diaphragm

A hole of 1.5 mm diameter is drilled in the diaphragm. The oil pressure switch is then mounted in normal position of use and subjected to a pressure of 1 000 kPa for 2 min with SAE 40 oil at 120 ± 2°C. There shall he no leakage after the test.

NOTE — Wherever, an air vent is used, a suitable vent plug should be provided.

8.15 Tightening Torque Strength Test

A torque of 29.4 Nm shall be applied. There shall be no breakage after this test.

8.16 Terminal Strength Test

A static load of 5 kgf shall be applied in the direction of its axis. There shall be no abnormality in the switch after this test.

9 MARKING

9.1 The switches shall be indelibly marked in a conspicuous place with the following information:

a) Name of the manufacturer/trade-mark if any, and
b) Type number or the operating pressure range.

9.2 BIS Certification Marking

Each switch may also be marked with the Standard Mark.

9.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standard Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(*Clause* 7.1.2)

RECOMMENDED PLAN OF SAMPLING FOR OIL PRESSURE SWITCHES FOR AUTOMOBILES

A-1 LOT

In any consignment all the oil pressure switches of the same type and manufactured in the same batch, shall be grouped together to constitute a lot.

From each lot, samples shall be taken and tested for acceptance test.

A-2 SCALE OF SAMPLING

The number of oil pressure switches to be selected from a lot, shall depend upon col 1 and col 2 of following table:

A-3 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

The oil pressure switches selected according to col 2 and col 3 of Table 1 shall be tested for all acceptance tests. If an oil pressure switch fails in any one of the acceptance tests, it shall be called a defective. A lot shall be considered as conforming to the specification, if the number of oil pressure switches failing to satisfy any one of the acceptance tests, shall not exceed the corresponding permissible number of defectives (see col 4 of Table 1).

Table 1

(*Clause* A-2)

Sl No. (1)	**Lot Size (n)** (2)	**Sample Size (n)** (3)	**Permissible Number of Defectives** (4)
i)	Up to 200	13	1
ii)	201 - 300	20	1
iii)	301 - 400	32	2
iv)	401 - 500	50	3
v)	501 - 800	80	5
vi)	1 301 and above	125	7

NOTE — The sampling plan recommended here assures that lots with 2.5 percent or less defectives would be accepted most of the times. The oil pressure switches shall be selected at random. In order to ensure the randomness of selection, the procedures given in IS 4905 shall be followed.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: TED 11 (1046).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, CHANDIGARH 160019	26 50206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi